

REMARKS

Applicants appreciate the Examiner's thorough examination of the subject application and, further, request reconsideration of the subject application based on the foregoing amendment and the following remarks.

Claims 1-9, 11-16, 18-28, 30-38, and 40-61 are pending in the application. Claim 22 has been amended to incorporate the subject matter of claim 29, which is now canceled. Claim 42 has been amended to incorporate the subject matter of claim 49, which is now canceled. The amendments are fully supported by the specification as originally filed.

As recited in claim 1, Applicants' claimed invention is directed to an image reproducing method for reproducing an image by a display apparatus, including steps of:

obtaining an average signal level which is an average level on all pixels, and then setting an input signal – output brightness property which represents variations in brightness of a pixel with respect to the average signal level;

reproducing an image so as to satisfy the input signal – output brightness property thus set; and

reproducing the image so that the maximum output brightness of a pixel varies in accordance with the average signal level.

According to the foregoing method (and the apparatus of claim 57), for example, even when using a display apparatus (i.e., liquid crystal display device or the like) which has a constant maximum output brightness regardless of the input average signal level, it is possible to reduce screen glare when reproducing a bright image so as to prevent the onset of temporary blindness due to the retinal bleaching phenomenon when directly viewing the screen. Therefore, the claimed method improves visibility of images that are bright overall (images with high average brightness). Consequently, an image reproducing method is provided that is capable of reproducing an image with high display quality regardless of the average signal level – maximum output brightness property of the display apparatus (see specification at page 14, line 8 to page 15, line 4; page 56, line 14 to page 57, line 1).

As recited in claims 16 and 38 of the Applicants' claimed invention, the maximum output brightness decreases with an increase in the average signal level. Such a property results in improved visibility for portions of an image which are dark overall (an image with low average brightness), thereby preventing a bleached look to the display. Moreover, screen glare is reduced for an image which is bright overall (an image with high average brightness), thus improving visibility for the bright portions. The claimed method is capable of reproducing images with good visibility, whether the images are dark or bright overall (see specification at page 59, lines 4-14).

As recited in claim 2 and other claims, it is preferred in the Applicants' invention that an image is reproduced such that the exponential value (gamma index for a CRT display) of the input signal – output brightness property as approximated using an exponential function increases further when the average signal level increases. This improves visibility of portions of an image which are dark overall (an image with low average brightness) and also for portions of an image which are bright overall (an image with high average brightness) (see specification at page 58, line 17 to page 59, line 3).

Claims 1-6, 9, 11, 12, 14, 15, 22-28, 30-33, 35, 37, 42-48, 50-53, 55-59 and 61 were rejected under 35 USC §103(a) as being unpatentable over U.S. Patent 5,546,134 to Lee in view of Japanese Publication 06-006820 to "Tadashi". Claims 16, 18, 20, 38, and 40 were rejected under 35 USC §103(a) as being unpatentable over U.S. Patent 6,278,436 to Hosoi et al. (hereinafter "Hosoi") in view of Tadashi. Claims 8, 29, 36, 49, and 60 were rejected under 35 §103(a) as being unpatentable over Lee and Tadashi in view of U.S. Patent 6,289,162 to Uehara et al. The remaining dependent claims also were rejected on combinations of prior art references. These rejections are respectfully traversed.

Lee discloses a method for adjusting the brightness and contrast of a video signal using an average image level. For example, with reference to FIG. 5, the video enhancer circuit of Lee includes an A/D converter 10 for converting an input video signal from analog to digital; an APL calculator 20 which receives an output video signal from the A/D converter 10 and calculates an

nAPL value; a look-up table block 30 for correcting the output signal from the A/D converter 10 for output in accordance with the nAPL value output from the APL calculator 20; and a D/A converter 40 for converting an output signal from the look-up table block 30 to an analog video signal.

In Lee, with reference to FIG. 5, the look-up table block 30 corrects and outputs the brightness of the video input signal according to the level of the video input signal and the corresponding nAPL value, and the D/A converter produces a video signal for output with the brightness and contrast being corrected (see column 3, lines 29-32; column 4, line 66 to column 5, line 11; and column 5, lines 20-26 and 37-39).

However, Lee fails to teach or suggest an image display apparatus or image reproducing method in which the image is reproduced so that maximum brightness of a displayed image varies in accordance with the average signal level.

On the other hand, Tadashi detects an APL which represents the average level of a brightness signal, i.e., one of the analog video signals, and determines whether the value of the detected APL is greater or smaller than a predefined value.

In Tadashi, when the average brightness is greater than the predefined value over a screen display period, the screen appears whitish, and the APL is greater than the predefined value. However, since the first gamma correction memory is selected which stores gamma correction data for extending the white level, the receiving end has a gamma correction property with the white level extended, as shown in FIG. 2(b).

Moreover, in Tadashi, when the average brightness is smaller than the predefined value, the screen appears blackish, and the APL is smaller than the predefined value. However, since the second gamma correction memory is selected which stores gamma correction data for extending the black level, the receiving end has a gamma correction property with the black level extended, as shown in FIG. 3(b) (see paragraphs 17-20).

In Tadashi, the maximum brightness of an image displayed on a liquid crystal display is roughly determined by the output of a light emitting element. The input signal – output brightness property is roughly determined by the properties of an optical switching element. In the display image, the maximum output brightness and the input signal – output brightness property are independent properties (see, e.g., paragraph 24). Accordingly, the gamma correction property of Tadashi relates to the input signal – output brightness property, not to the maximum output brightness.

Therefore, if Tadashi were somehow combined with Lee, it would still not be possible to produce the image reproducing method and apparatus of the claimed invention, whereby **an image is reproduced such that the maximum output brightness of an image produced by the display varies in accordance with an average signal level.**

Uehara relates to a high speed image reproducing device and method, which includes a frame change detector with which the device detects a frame change from a change in brightness and chromaticity levels from a reproduced image and the one-field proceeding image. Uehara does not disclose a method or apparatus whereby the maximum output brightness of an image produced by the display varies in accordance with an average signal level. Therefore, Uehara could not be combined with Lee and Tadashi to produce the Applicants' claimed invention.

With regard to the Eglit reference, it is pointed out that FIGS. 1A to 1C appear to be referring to the same gamma correction as that depicted in FIGS. 2-6 of Tadashi. Therefore, Eglit could not somehow be combined with Lee and Tadashi to produce the Applicants' claimed invention.

None of the other references cited teach or suggest the above-mentioned features of the Applicants' claimed invention. Therefore, none of the references could be combined to produce the claimed method and apparatus as recited in claims 1, 16, 22, 38, 42, or 57.

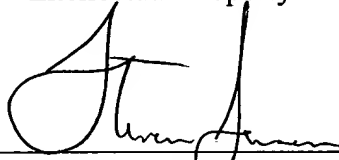
It is believed that the claims are now in condition for allowance. However, if there are any outstanding issues, the Examiner is urged to call the Applicants' representative at the telephone number listed below.

Applicants believe that additional fees are not required for consideration of the within response. However, if for any reason a fee is required, a fee paid is inadequate or credit is owed for any excess fee paid, the Commissioner is hereby authorized and requested to charge Deposit Account No. 04-1105.

Respectfully submitted,

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